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DONALD AVES

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EXAMINER

JONES, HUGH M

ART UNIT

PAPER NUMBER

2128

DATE MAILED: 06/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/320,303

Applicant(s)

AVES, DONALD

Examiner

Hugh Jones

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-9 and 22-25 is/are allowed.
- 6) ☒ Claim(s) 10-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Cases which have been decided by the Board of Patent Appeals and Interferences will not be reopened or reconsidered by the primary examiner except under the provisions of § 1.114 or § 1.196 without the written authority of the Commissioner, and then only for the consideration of matters not already adjudicated, sufficient cause being shown.

2. The Board of Patent Appeals and Interferences did not sustain the rejections of the appealed claims. However, the Board raised the question of whether the claims are statutory.

3. Prosecution is reopened in order to apply a 101 rejection, as per the analysis provided on pages 19-24 of paper # 23 (Decision by Board).

Furthermore, new prior art has been obtained and is also applied in a new prior art rejection.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. **Claims 10-15, 17, 18, 21 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.** The language of the claim raises a question as to whether the claim is directed merely to an abstract idea that is not tied to a technological art, environment or machine which would result in a practical application producing a concrete, useful and tangible result to form the basis of statutory matter under 35 U.S.C. 101.

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6. In particular, the claims are directed to an "abstract idea". Please refer to pages 19-24, paper # 23 (Decision by Board) for a legal analysis. The analysis is hereby incorporated by reference. The claimed model and steps are theoretical operations on data, which are not embodied in any physical structure or physical transformation steps.

Claim Interpretation

7. The broadest reasonable interpretation has been given to the claims. The claims were examined with the most reasonable interpretation, based on the specification, for purposes of prior art rejections.

8. It is interpreted that the claimed invention is directed to design of an optimal (based on a user defined criterion) coupled multi-transmission line system. The allowed claims are also directed to a reordering of the sequence of the various transmission line segments.

9. Claims 1-9 have been interpreted in view of 35 U.S.C. 112, and *In re Donaldson*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994). Reciting the pertinent section of 35 U.S.C. 112, paragraph six:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. **Claims 10-12, 14-16, 19 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Levy.**

Levy discloses an **exact synthesis procedure** which is derived for a class of asymmetric **multi-element coupled-transmission-line** directional couplers with any number of elements. It is based on the equivalence between the theory of the directional coupler and that of a stepped **quarter-wavelength filter**. This can be treated using Richards' theorem for the **synthesis** of **transmission-line** distributed networks, as described previously by Riblet. The method is extended to give a general expression for the input reflection coefficient of the stepped filter, which corresponds to the voltage coupling of the directional coupler. Explicit formulas for the parameters of two, three, four and five couplers are derived and the extension to larger number of elements is straightforward.

12. The claims are recited and the correspondence to the prior art is supplied.

Claim 10: A method for optimizing the segment characteristics of a segmented transmission line, comprising the steps of:

modeling the electrical performance of the segmented transmission line
("***synthesis of multi-element coupled transmission lines***" see title; abstract;
"an **exact synthesis procedure** which is derived for a class of asymmetric

multi-element coupled-transmission-line directional couplers with any number of elements.”; figures 5, 6, 8, 10),

evaluating the model for electrical performance (equations 3, 6 “insertion loss”; see example beginning on second column of page 229; figures 5, 6, 8, 10), and

selecting a set of segment characteristics, based on the evaluation, which meets a set of predefined optimization criteria (fig. 2 - “theta”; page 230, right hand column, top – “electrical length theta”).

Claim 11: the method according to claim 10, wherein the set of segment characteristics comprises a respective length of each segment (fig. 2 - “theta”; page 230, right hand column, top – “electrical length theta”).

Claim 12: The method according to claim 10, wherein the model is evaluated to determine a transfer function of the segmented transmission line (formulas 7, 27-28, 35, 36, 47, 54-58, 88; “transfer matrix”).

Claim 14: The method according to claim 10, wherein a precision of the evaluation exceeds a manufacturing tolerance of the segmented transmission line (first sentence of abstract, “an **exact** synthesis procedure...”).

Claim 15: The method according to claim 10, further comprising outputting a predicted performance of the segmented transmission line based on the respective segment characteristics (figures 5, 6, 8, 10).

Claim 16: The method according to claim 10, further comprising the step of producing a set of transmission line segments according to the selected segment characteristics (figures 4, 7, 9 – actual devices).

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Claim 19: a segmented transmission line, produced according to claim 16, wherein the segment characteristic comprises a respective segment length and the optimization criteria comprises a minimization of worst case VSWR over a radio frequency band (text in column 2, page 231; top, column 1, page 232).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

15. The prior art will be applied and analyzed as per the Graham Deere Inquiries. The claims will then be recited and the correspondence to the prior art noted.

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16. **Claims 13, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Levy in view of Fleming-Dahl "F" (U. S. Patent 5,218,326 - of record).**

17. **Levy** discloses an exact **synthesis** procedure which is derived for a class of asymmetric multielement coupled-**transmission-line** directional couplers with any number of elements, as applied to the intervening claims. It is based on the equivalence between the theory of the directional coupler and that of a stepped **quarter-wavelength filter**. This can be treated using Richards' theorem for the **synthesis of transmission-line** distributed networks, as described previously by Riblet. The method is extended to give a general expression for the input reflection coefficient of the stepped filter, which corresponds to the voltage coupling of the directional coupler. Explicit formulas for the parameters of two, three, four and five couplers are derived and the extension to larger number of elements is straightforward.

18. Levy does not disclose (claim 13) that the transmission line is an RF coaxial line.

19. Levy further does not disclose (claim 20) a segmented transmission line, produced according to claim 16, wherein the segmented transmission line comprises an air-spaced coaxial transmission line adapted for transmitting an RF signal; the segment characteristic comprises a respective segment length and the optimization criteria comprises a minimization of worst case VSWR over a radio frequency band.

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20. ***Fleming-Dahl*** discloses a ***method of defining component lengths, especially cable lengths, in a radio frequency or microwave system so as to minimize in-phase coupling of voltage reflections in the system involves the use of prime roots of prime numbers as scaling factors which are multiplied with a minimum component length to obtain a list of potential component lengths. The scaled potential component lengths are then screened for accidental relationships with component lengths obtained using lower order roots in order to prevent accidental harmonic relationships from arising in the system***, and the resulting screened list is evaluated to ensure that the remaining potential component lengths meet such system requirements as available spans, minimum and maximum component lengths, number of lengths required, and ***matched Insertion Loss requirements***. In order to screen the scaled potential component lengths, windows are constructed around the potential lengths based on ***component manufacturing tolerances***, and subsequently adjusted as necessary.

21. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teaching of Levy with the disclosure of Fleming-Dahl for the following reasons:

- the transmission line equations and synthesis procedures apply equally well to all particular implementations of transmission lines. The choice of physical design (waveguide vs co-axial, for example) depends on the frequency of operation and is an *inherent* consequence of basic Maxwell's equations for electro-magnetics.

Fleming-Dahl discloses (see abstract, for example) that the application can be to either RF or microwave applications and further teaches the use of co-axial ("cable") structures.

22. The claims are recited and the correspondence to the prior art is noted.

Claim 13: The method according to claim 10, wherein the segmented transmission line comprises an air-spaced coaxial line adapted for transmitting an RF signal (**col. 1, lines 10-13, col. 2, lines 18-30**), the predefined optimization criteria comprising a signal transmission efficiency (**F: col. 1, line 31 to col. 2, line 17; col. 2, lines 41-54; col. 3, lines 10-20; col. 4, lines 14-32; col. 4, line 52 to col. 6, line 19; col. 7, lines 23-61**). See Levy at text in column 2, page 231; top, column 1, page 232.

Claim 20: a segmented transmission line, produced according to claim 16, wherein the segmented transmission line comprises an air-spaced coaxial transmission line adapted for transmitting an RF signal (**col. 1, lines 10-13, col. 2, lines 18-30**); the segment characteristic comprises a respective segment length (**F: abstract; figures 1-7; col. 2, line 66 to col. 4, line 20; col. 4, line 52 to col. 6, line 19; col. 7, lines 23-61**) and the optimization criteria comprises a minimization of worst case VSWR over a radio frequency band (**F: col. 1, line 31 to col. 2, line 17; col. 2, lines 41-54; col. 3, lines 10-20; col. 4, lines 14-32**). See Levy at text in column 2, page 231; top, column 1, page 232.

Allowable Subject Matter

23. Claims 1-9 and 22-25 are allowed over the prior art of record.

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24. Claims 17-18, 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form (and if all other rejections are traversed) including all of the limitations of the base claim and any intervening claims.

25. The following is an examiner's statement of reasons for allowance: the sequencing of the segments as disclosed in the specification is not disclosed or suggested in the prior art of record.

Response to Arguments

26. Applicant's arguments (papers # 12, 14) with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

However, the Examiner would like to point out that the inventive feature, as determined by the Board of Appeals, namely, the reordering of the various transmission line segments to produce a system optimization, is not claimed in the rejected claims.

27. In anticipation of arguments that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the reordering of the various transmission line segments to produce a system optimization) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

28. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The art is not applied because it is cumulative.

- **Mao et al.** disclose time responses of **coupled transmission lines**. **Coupled transmission lines** are synthesized from the given near-end and far-end time-domain responses. The inductance matrix L and capacitance matrix C of uniformly coupled lossless lines can be obtained from the responses without any approximation. As for uniform lossy lines, the impedance matrix $(LC)^{-0.5}L$ and the modified resistance matrix $(LC)^{-0.5}R$ are obtained by the characteristics method, and in the special case that $LC=CL$, the L , C , and R matrices can be derived. An equivalent time-domain model is developed by the generalized characteristics method for nonuniformly coupled lossless and lossy lines from the given near-end responses.
- **Ishii et al.** disclose simulation and design of coupled transmission lines. See figure 5.
- **Custer et al.** disclose impedance matching using different impedance transmission lines. See col. 2, lines 39-49; col. 8, line 66 to col. 9, line 6.
- **Riblet** discloses analysis and design of coupled transmission lines.

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29. Any inquiry concerning this communication or earlier

communications from the examiner should be:

directed to:

Dr. Hugh Jones telephone number (703) 305-0023, Monday-Thursday 0830 to 0700 ET, **or** the examiner's supervisor, Kevin Teska, telephone number (703) 305-9704. Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, telephone number (703) 305-3900.

mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:


(703) 308-9051 (for formal communications intended for entry)

or (703) 308-1396 (for informal or draft communications, please label "PROPOSED" or "DRAFT").

Dr. Hugh Jones

Primary Patent Examiner

June 24, 2004


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